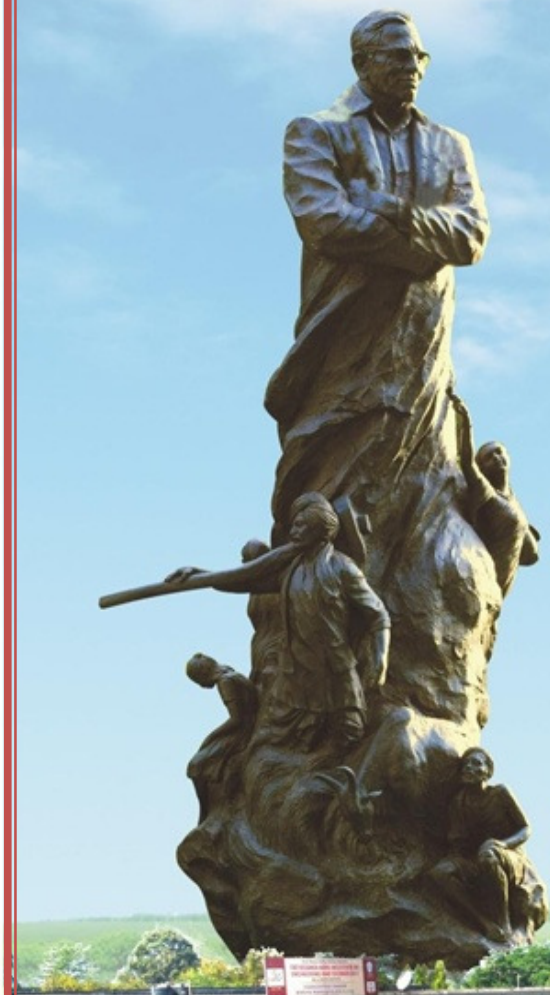
An Autonomous Institute

Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering And Technology, Warananagar

NBA Accredited Institute



Department of Electronics & Telecommunication Engineering

Syllabus for S.Y.B.Tech. w.e.f. 2024-25

B. Tech. In Electronics &Telecommunication Engineering

Proposed Structure and Syllabus under Autonomy as per the NEP Policy 2020

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Department of Electronics & Telecommunication Engineering

❖ Vision

To prepare professionally competent Electronics & Telecommunication Engineer for Global Industrial requirements and social needs.

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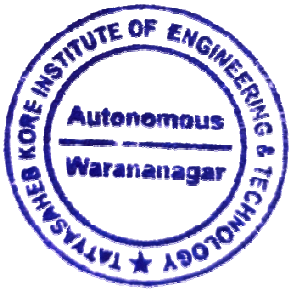
❖ Mission

- To offer excellent education with industry-aligned curriculum, effective teaching, and facilities, promoting global competence.
- To provide value-added courses through Industry-Institute interactions.
- To make students competent for higher studies and to develop entrepreneurial skills for enhancing their employability.
- To instill professional ethics, leadership, and a passion for lifelong learning with social, cultural, and environmental awareness.



Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Department of Electronics & Telecommunication Engineering

PROGRAM EDUCATIONAL OBJECTIVES

Graduates will be able:

[1] Able to design and innovate electronic systems to solve real-world problems using scientific and engineering principles.

[2] Encouraged for interdisciplinary learning for success in professions, higher education, research, And entrepreneurship.

[3] Nurtured with leadership, management, and communication prowess, ethical values, teamwork, and a commitment to lifelong learning .

PROGRAM OUTCOMES:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

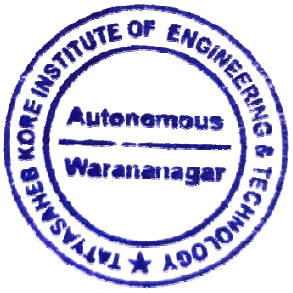
PROGRAM SPECIFIC OUTCOMES:

After successful Electronics and Telecommunication engineering graduates will be able to:

PSO 1 (Engineering Knowledge and Analysis):
Analyze specific engineering problems relevant to Electronics & Telecommunication Engineering by applying the knowledge of basic sciences, engineering mathematics and fundamentals.

PSO 2 (System Design):
Design Electronics and Telecommunication systems containing devices, software, and hardware using the significant analytical knowledge and modern tools.

PSO 3 (Application of the knowledge on society/environment):
Apply the contextual knowledge of Electronics and Telecommunication Engineering to assess societal, environmental, health, safety, legal and cultural issues with professional ethics and function effectively as an individual or a leader in a team to manage different projects as the process of life-long learning.



SWVSM'S

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Abbreviations

Sr.No.	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE-I	In-Semester Examination-I
3	ISE-II	In-Semester Examination-II
4	ESE	End Semester Examination
5	ISA	In-Semester Assessment(Term Work)
6	L	Lecture
7	T	Tutorial
8	P	Practical
9	CH	Contact Hours
10	C	Credit

Course/Subject Categories

Sr. No.	Acronym	Definition
1	PCC	Professional Core Course
2	MDM	Multidisciplinary Minor
3	OE	Open Electives
4	HSSM	Humanities social science and Mgmt
5	ELC	Experiential Learning Courses
6	VSEC	Vocational and skill Enhancement course
7	AEC	Ability Enhancement Course

Course/Subject Code

ET	E	3	0	1
Branch Code		Semester	Course Number	

Course Term work and POE Code

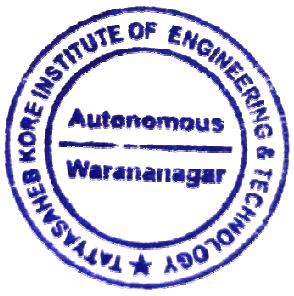
ET	E	3	0	1	T/P/A
Branch Code		Semester	Course Number		T- Term Work P-POE A-Audit Course

Second Year B. Tech.

In Electronics & Telecommunication Engineering

Structure and Syllabus under Autonomy as per the NEP Policy 2020

2024-25



Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

Second Year B. Tech. (Electronics and Telecommunication Engineering)

Semester-III

(To be implemented from 2024 - 25)

Credit Scheme as per NEP Policy

Sr. No,	Category	Sub Category	Course Code	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
					L	T	P	C	CH	Component	Marks	Min for Passing	
1	Programme Course	PCC	23UGPCCET301	Engineering Mathematics -III	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
2		PCC	23UGPCCET302	Electronic Devices & Circuits-I	3	--	--	3	3	ESE	60	24	40
										ISE	40	16	
3		PCC	23UGPCCET303	Digital Electronics & Microprocessor	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
4		PCC	23UGPCCET304	Electrical Circuits	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
5		PCC	23UGPCCET305	Electronic Instrumentation	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
6	Multi-disciplinary Courses	MDM1	23UGMDM1ET306L	Multi Disciplinary Minor-1	2	--	--	2	2	ISA	50	20	20
7	Humanities Social Science and Management	Entrepreneurship/Economics/ Management Courses	23UGEEC1ET3071L	Entrepreneurship/ Economics Course (EEC-1)	2*	--	--	1	2	ISA	25	10	10
		Value Education Course (VEC)	23UGVEC1ET3081T	Value Education Course (VEC-1)	2*	--	2	2	4	ISA	25	10	10
8	Experiential Learning Courses	Comm. Engg. Project (CEP)/Field Project (FP)	23UGCEPET309L	Electronics Engineering Practice(CEP/FP)	1	--	2	2	3	ISA	25	10	10
9	Programme Course	PCC	23UGPCCET301T	Engineering Mathematics -III	--	1	--	1	1	ISA	25	10	10
10		PCC	23UGPCCET302LP	Electronic Devices & Circuits-I Lab	--	--	2	1	2	ISA	25	10	10
										POE	50	20	20
11		PCC	23UGPCCET303LP	Digital Electronics & Microprocessor Lab	--	--	2	1	2	ISA	25	10	10
										POE	50	20	20
					22	1	8	21	31	--	800	320	320

*Additional contact hours are provided for the courses without any credit

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

Second Year B. Tech. (Electronics and Telecommunication Engineering)

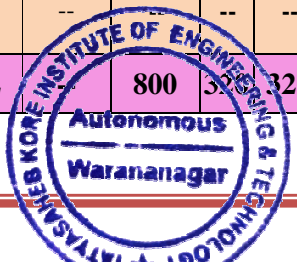
Semester-IV

(To be implemented from 2024 -25)

Credit Scheme as per NEP Policy

Sr. No.	Category	Sub Category	Course Code	Course Title	Teaching Scheme					Examination & Evaluation Scheme			
					L	T	P	C	CH	Component	Marks	Min for Passing	
1	Programme course	PCC	23UGPCCET401	Electronic Devices & Circuits -II	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
2		PCC	23UGPCCET402	Communication Engineering	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
3		PCC	23UGPCCET403	Linear Integrated Circuits	3*	--	--	2	3	ESE	60	24	40
										ISE	40	16	
4		PCC	23UGPCCET404	Control System Engineering	2*	--	--	1	2	ESE	60	24	40
										ISE	40	16	
5	Multi disciplinary Courses	MDM-2	23UGMDM 2 ET405L	Multi Disciplinary Minor-2	2	--	--	2	2	ISA	50	20	20
6		OE-1	23UGOE1 ET4061	Open Elective (OE) -1	3	--	--	3	3	ESE	60	24	40
										ISE	40	16	
7	Skill course	Vocational and Skill Enhancement Course (VSEC)	23UGVSECET407L	Data Structure & Algorithms	2*	--	--	1	2	ISA	25	10	10
8	Humanities Social Science and Management	Ability Enhancement Course	23UGAEC1 ET4081T	Ability Enhancement Course AEC-1	1	1	--	2	2	ISA	25	10	10
9		Entrepreneurship/Economics / Management Courses	23UGEEC2 ET4091L	Entrepreneurship / Economics Course (EEC-2)	2*	--	--	1	2	ISA	25	10	10
10		Value Education Course (VEC)	23UGVEC2 ET4101T	Value Education Course (VEC-2)	2*	--	2	2	4	ISA	25	10	10
11	Programme course	PCC	23UGPCCET401LP	Electronic Devices & Circuits –II Lab	--	--	2	1	2	ISA	25	10	10
										POE	25	10	10
12		PCC	23UGPCCET402LP	Communication Engineering Lab	--	--	2	1	2	ISA	25	10	10
										POE	25	10	10
13		PCC	23UGPCCET403LP	Linear Integrated Circuits Lab	--	--	2	1	2	ISA	25	10	10
										POE	25	10	10
14	AUDIT COURSE	A	23UGACET411A	Audit Course – III (Environmental studies)	---	--	--	--	--	--	--	--	--
					23	01	8	21	32	--	800	320	

*** Additional contact hours are provided for the courses without any credit**



Category: Humanities Social Science and Management (HSSM)

COURSE SEM –III

Entrepreneurship/ Economics Course (EEC-1)				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Humanities Social Science and Management	**EEC-1**	23UGEEC-ET3071L	1	Industrial Management
		23UGEEC-ET3072L	2	Entrepreneurship
		23UGEEC-ET3073L	3	Project Management
Value Education Course (VEC-1)				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Humanities Social Science and Management	**VEC-1**	23UGVEC-ET3081T	1	Programming Lab – I
		23UGVEC-ET3082L	2	Respect and Empathy
		23UGVEC-ET3083L	3	Leadership and Ethical Decision Making

CATEGORY : MULTIDISCIPLINARY (MDM)

COURSE SEM –III

Category	**Sub Category**	**Course Code**	**Name of Course**	
Multidisciplinary Courses	**MDM-1**	23UGMDMET306L	1	Digital Electronics.

Category: Humanities Social Science and Management (HSSM)

COURSE SEM –IV

Ability Enhancement Course (AEC-1)				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Humanities Social Science and Management	**AEC-1**	23UGAEC-ET4081T	1	Marathi
		23UGAEC-ET4082T	2	Hindi
		23UGAEC-ET4083T	3	Gujarati
Entrepreneurship/ EconomicsCourse (EEC-2)				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Humanities Social Science and Management	**EEC-2**	23UGEEC-ET4091T	1	Financial Management
		23UGEEC-ET4092T	2	Event Management
		23UGEEC-ET4093T	3	Plumbing and Electrical Skill
Value Education Course (VEC-2)				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Humanities Social Science and Management	**VEC-2**	23UGVEC-ET4101T	1	Programming Lab- II (Python)
		23UGVEC-ET4102L	2	Social Responsibility and Citizenship
		23UGVEC-ET4103L	3	Values in Education Policies and Practice

CATEGORY : MULTIDISCIPLINARY (MDM)

COURSE SEM –IV

Open Elective – OE- 1				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Multidisciplinary Courses	**Open Elective – OE1**	23UGOE1-ET4061	1	Electrical Technology
		23UGOE1-ET4062	2	Transducers and Sensors

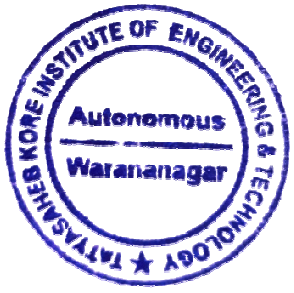
COURSE SEM –IV

MDM-2				
Category	**Sub Category**	**Course Code**	**Name of Course**	
Multidisciplinary Courses	**MDM-2**	23UGMDMET405L	1	Digital system Design

Second Year B. Tech.

(Electronics & Telecommunication Engg.)

First Semester Detailed Syllabus



23UGPCCET301- ENGINEERING MATHEMATICS - III

Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to :	
1	To develop mathematical skills and enhance thinking power of students
2	To give the knowledge to the students of Linear Differential Equations, Laplace transforms, Fourier series, probability, Vector Differential Calculus with an emphasis on the application of solving Engineering Problem.
3	To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Use of Linear Differential Equations and vector differentiation to find directional derivatives, curl and divergence of vector field.	Understanding, Application
CO2	Use Laplace and Inverse Laplace to solve linear differential equations	Understanding
CO3	Develop Fourier series expansion of a function over the given interval	Understanding, Application
CO4	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.	Applying

Description:

Engineering Mathematics course is offered as the basic science course. This course contains Mathematical methods and techniques that are typically used in engineering to solve complex engineering problems. This course has six units namely i) Linear Differential Equations(LDE) and its Applications ii) Vector Differential Calculus iii) Laplace Transformand iv) Inverse Laplace Transform and its Applications v) Fourier Series vi) Probability Distribution

Prerequisites:	1	Trigonometric identities and Logarithmic identities
	2	Differentiation and integration formulae
	3	Basic knowledge of probability.

Course Contents		
Unit No:1	**Linear Differential Equations (LDE) and its Applications:** 1 Linear Differential equations with constant coefficients. 2 Rules to find complementary function. 3 Methods to find particular Integral 4 Applications of linear differential equations with constant coefficients to Electrical Engineering.	**7 Hrs.**
Unit No:2	**Vector Differential Calculus:** 1 Differentiation of vectors. 2 Gradient of scalar point function. 3 Directional derivatives. 4 Divergence of vector point function. 5 Curl of a vector point function. 6 Irrotational, Solenoidal and Scalar potential function of a vector field	**7 Hrs.**
Unit No:3	**Laplace Transform** 1 Laplace transform of elementary functions 2 Properties of Laplace transforms 2.1 Linearity Property 2.2 First Shifting property 2.3 Change of scale property 3 Laplace transforms of derivatives and integral. 4 Multiplication by t^n and division by t 5 Evaluation of integrals by Laplace transform	**7 Hrs.**
Unit No:4	**Inverse Laplace Transform and its Applications:** 1 Definition and important formulae 2 First shifting property 3 Inverse Laplace transform by method of partial fraction 4 Convolution theorem (without proof) 5 Inverse Laplace transform of derivatives 6 Solution of Linear differential equation with constant coefficients using Laplace transform	**7 Hrs.**
Unit No:5	**Fourier Series:** 1 Definition, Euler's formulae, Dirichlet's conditions. 2 Fourier Series of periodic function with period 3 Change of interval. 4 Expansions of odd and even functions. 5 Half range series.	**7 Hrs.**
Unit No:6	**Probability Distribution**: 1 Basic definitions , Conditional probability 2 Random variables. 3 Discrete Probability distribution. 4 Continuous probability distribution. 5 Binomial Distribution. 6 Poisson Distribution. 7 Normal Distribution	**7 Hrs.**

Text Books:	
1	“Higher Engineering Mathematics”, by B. S. Grewal, Khanna Publication Delhi.

Reference Books:	
1	“Advance Engineering Mathematics”, by Erwin Kreyszig,Wiley India.
2	“Advanced Engineering Mathematics”, by H. K. Das,S. Chand Publication.
3	“A text book of Applied Mathematics”, by J. N. Wartikar & P. N. Wartikar, Vol. I, II and III Vidyarthi Griha Prakashan, Pune.

23UGPCCET302- ELECTRONIC DEVICES & CIRCUITS -I

Lecture : 3 Hrs/Week
Credit : 3

Evaluation Schemes
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to :	
1	Provide an introduction and basic understanding of Semiconductor Devices viz. diodes and BJT, JFET.
2	Provide basic analog electronic circuit design techniques using diodes and bipolar junction transistors and to develop analytical skills.
3	Develop student ability to apply basic engineering sciences to understand the Operation & analysis of electronic circuits using diodes and bipolar junction transistors.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Describe and design electronic circuits such as rectifiers & unregulated power supply.	Knowledge, Application
CO2	Solve the problems of electronic circuit design such as regulated power supply.	Analysis
CO3	Analyze & Design LPF, HPF, Clipper, Clampers, Multipliers	Knowledge
CO4	Explain operation of BJT & FET Biasing circuit.	Application
CO5	Summarize the hybrid model of transistor and analyze the transistor amplifier (CE, CB, and CC) using h-parameters.	Knowledge
CO6	Analysis of CE Amplifier for low frequency & High frequency response for sinusoidal & square wave input.	Application

Description:

Electronics Device and Circuit-I course is a core electronics course. This course describes the concept of electronics circuit design. It gives the concept of different electronics circuit for their detail operation and working principle. Also, it describes the specifications of devices and its use for different applications.

Prerequisites:	1	Semiconductor Physics
	2	Basic Electronics
	3	Electronics Measurement

Course Contents		
Unit No:1	**Unregulated Power Supplies:** Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, form factor etc. Filters: Need of filters, Types: capacitor, inductor, LC, CLC, and Analysis for ripple factor. Design of unregulated power supply with filter using full wave rectifier.	**8 Hrs.**
Unit No:2	**Voltage Regulators :** Need of voltage regulator, Stabilization factors, Analysis & Design of Shunt regulator (using Zener diode & BJT),emitter follower regulator, series pass voltage regulator (using BJT), Pre- regulator & Overload protection circuit.	**8 Hrs.**
Unit No:3	**Wave Shaping Circuits:** Low pass & high pass RC circuits (analysis for square, step, ramp, exponential input), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: diode clippers, transistor clippers, Transfer characteristics, Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits, and voltage multipliers.	**8 Hrs.**
Unit No:4	**BJT & FET Biasing** Introduction to BJT, Need of Biasing, Generalized stability factor derivation, Biasing of CE configuration-Fixed Bias, Collector to Base Bias & Voltage Divider Bias (Analysis & Design of the same with & without Re). Introduction to JFET, Biasing of CS configuration- Fixed Bias, Self Bias (Analysis & Design of the same).MOSFET-EMOSFET & DMOSFET (Working & Characteristics)	**8 Hrs.**
Unit No:5	**Voltage Amplifiers:** H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), amplifier equations for Voltage Gain, Current gain, Input resistance & Output resistance taking Rg of source into account.(Numerical are expected)	**8 Hrs.**
Unit No:6	**Frequency Response of Single Stage RC Coupled Amplifier:** Low frequency response: Effect of emitter bypass capacitor(CE) & Coupling capacitor(CC), Amplifier response to square wave, percentage Sag calculation, (Numerical are expected) High frequency response: Hybrid π model , Derivation for CE short circuit & resistive current gain cut off cutoff frequency, amplifier high freq. response to square wave, gain bandwidth product, (Numerical are expected). Design of single stage RC coupled amplifier.	**8 Hrs.**

Text Books:	
1	" Electronic devices & circuits", Allen Mottershed, Prentice- Hall India
2	" Electronic devices & circuits", J. Millman & C. Halkias,Tata McGraw Hill Publication
3	" A Text Book of Applied Electronics", Dr. R. S. Sedha, S Chand and Company

Reference Books:	
1	"Electronic devices & circuits", David A. Bell, Oxford University
2	"Electronic devices & circuits", Salivahanan,N Suresh kumar, Tata McGraw Hill Publication
3	" Electronic devices & circuit theory", Robert L. Boylsted, Louis Nashelsky, Pearson Education

23UGPCCET303- DIGITAL ELECTRONICS AND MICROPROCESSOR

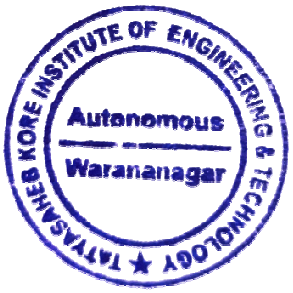
Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives:	
The course aims to make the student understand :	
1	The fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
2	Boolean algebra, Karnaugh maps and its application to the design and characterization of digital circuits.
3	To analyze logic processes and implement logical operations using combinational logic circuits.
4	The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Use the basic logic gates and various reduction techniques of digital logic circuit.	Remembering
CO2	Analyze, design and implement combinational logic circuits.	Apply
CO3	Analyze, design and implement sequential circuits.	Apply
CO4	Explain microprocessor architecture and its instruction set	Understand
CO5	Explain interfacing of devices to microprocessor	Understand
CO6	Design Microprocessor based Systems	Create

Description:		
This is very important core course offered in Electronics and Telecommunication Engineering. Embedded Systems, VLSI Design, Robotics Systems, Communication Systems etc. are using Digital Systems like microprocessors and microcontrollers. Also to design any electronics system digital electronics is required. To understand digital transformation and design any System, this course plays very important role.		
Prerequisites:	1	Logic gates, Number systems



Course Contents		
Unit No:1	**FUNDAMENTALS OF DIGITAL ELECTRONICS:** Number system and codes and their Arithmetic (Binary, HEX, BCD), Simplification of logical equation using Boolean and De-Morgan's theorem. Introduction to canonical forms, Standard representations for logic functions, k-map representation of logic functions (SOP and POS forms), minimization of logical functions for min-terms and max-terms (up to 4 variables), don't care conditions,	**8 Hrs.**
Unit No:2	**LOGIC GATES AND ITS BASIC APPLICATIONS:** Basic gates and derived gates, realization of logic expression using gates. Universal gates, implementation of logic functions using universal gates.	**4 Hrs.**
Unit No:3	**COMBINATIONAL LOGIC**: Definition of combinational logic, Design of arithmetic circuits – Adder, subtractor, BCD adder, comparator, parity generator /checker, code converter, Multiplexer, Demultiplexer, Decoder, BCD to seven segment decoders.	**8 Hrs.**
Unit No:4	**SEQENTIAL LOGIC:** 1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals. Excitation Table for flip flop, Conversion of flip flops, Application of Flip flops:- Registers, Shift registers, Counters-Asynchronous and synchronous counter design.	**8 Hrs.**
Unit No:5	**DIGITAL LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES:** TTL logic, CMOS logic. Memory organization and operation, expanding memory size, Classification of memories, RAM ROM, EPROM, EEPROM, NVRAM, SRAM, and DRAM	**4 Hrs.**
Unit No:6	**FUNDAMENTALS OF MICROPROCESSORS :** 8085 microprocessor features, pin functions , architecture, programming model. Addressing modes, Instruction set, Introduction to Timing diagram-T-state , Timing diagram of instructions. stack operations and subroutines, Interrupt structure. Assembly language programming	**7 Hrs.**

Text Books:	
1	"Modern Digital Electronics", R.P. Jain, Tata McGraw Hill Publication, 3rd Edition
2	"Fundamentals of Digital Circuits", Anand Kumar, Prentice Hall of India, 1st Edition.
3	"Microprocessor Architecture Programming and Application with 8085", Ramesh Gaonkar, Penram International Publishing India.

Reference Books:	
1	"Digital Logic and Computer Design", M. Morris Mano, Prentice Hall of India, 4 th Edition.
2	"The 8085 Microprocessor-Architecture & programming and Interfacing", K. Uday Kumar & Umashankar, Pearson Publication.
3	Intel Data sheet (8085)

23UGPCCET304- ELECTRICAL CIRCUITS

Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	To Identify and draw network graphs and their parts.
2	To analyze DC & AC circuits using network theorems.
3	The types of two port network and their analysis.
4	The constructional details, characteristics, features and application areas of various types of electric motors.

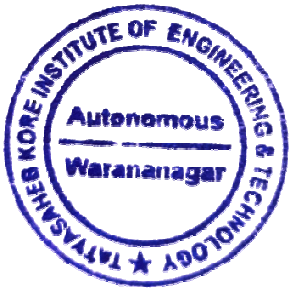
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Identify and apply the rules of network topology to various electric network	Understanding & Applying
CO2	Analyze the simple DC and AC circuit with circuit simplification techniques.	Analyzing
CO3	Formulate & Evaluate network parameters for given network and analyze the given network using Laplace Transform.	Evaluating
CO4	Understand & explain construction, working and applications of all types of motors.	Understanding

Description:

The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering applications. It aims to establish a firm understanding of the laws of electric circuit which develops a working knowledge of the methods of analysis used most frequently in further topics of electronics engineering. The course deals with the DC and AC circuit analysis using network theorems, two port network & network functions. The course focuses on construction and working principles of different dc and ac motors.

Prerequisites:	1	Basic Electrical Engineering



Course Contents		
Unit No:1	**FUNDAMENTALS OF NETWORK THEORY:** Tree and Co-tree, Incidence Matrix, Tie-set Matrix, Cut-set Matrix, Mesh Analysis, Nodal Analysis. Series & parallel connection of passive elements(R,L,C) interconnection, source transformation	**6 Hrs.**
Unit No:2	**DC & AC CIRCUIT ANALYSIS USING NETWORK THEOREMS:** Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Duality theorem, Millman's Theorem. **STEADY STATE ANALYSIS:** Superposition Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem.	**8 Hrs.**
Unit No:3	**TWO PORT NETWORKS:** Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters (ABCD), Interrelation of different parameters, Interconnections of two port network, T & pi representation. **NETWORK FUNCTIONS:** Transfer functions of two port network, poles and zeros, time domain response from pole zero plot.	**8 Hrs.**
Unit No:4	**FILTERS:** Introduction, Classification, Low pass, High pass, Band pass & Band reject filter, Design & analysis of constant K, M derived & composite filters (low pass, high pass, band pass & band stop filters): T & Pi	**8 Hrs.**
Unit No:5	**DC MOTORS:** Construction, Working, Types, Back EMF, Speed equation, Torque equation, Speed torque characteristics of Dc shunt and series motor, Speed control of D.C. Shunt and series motor, Need of starter, 3 point starter, 4 point starter. (Numerical treatment on speed control methods)	**6 Hrs.**
Unit No:6	**SPECIAL PURPOSE MOTOR :** Construction, Working principle, characteristics and applications of Single phase permanent split capacitor type Induction motor, AC servo motor, DC servo motor, Stepper motor (VR type and PM type) and BLDC motor.	**8 Hrs.**

Text Books:	
1	"Circuit & Network – Analysis & Synthesis", A. Sudhakar ,Shyammohan S.Palli,,Tata McGraw Hill Publication, IIIrd Edition
2	"Circuit Theory (Analysis & Synthesis)", A.Chakrabarti, Dhanpat Rai & Co, IIIrd Edition.
3	"A Text book of Electrical Technology", B. L. Theraja , Vol-II , S. Chand publication, 1st Edition.
4	" Electric Machines", I.J.Nagrath & D.P.Kothari, TMH, 2nd Edition

Reference Books:	
1	"Network Analysis & Synthesis", Ravish R Singh, McGraw-Hill Education.
2	"Electrical Technology", U.A.Bakshi, Technical Publication Pune,4th Edition ,2009.
3	"Principles of Electrical Machines", V K Mehta and Rohit Mehta, S Chand Publications

23UGPCCET305- ELECTRONIC INSTRUMENTATION

Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to :	
1	Provide introduction to different types of Transducers with their classification, construction & application and Provide knowledge of different sensors and their applications
2	Provide knowledge of signal conditioning and instrumentation system and Provide basic knowledge of measurement system
3	Provide basic understanding of different Electronic instruments and Provide knowledge of different types of bridges

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Student will able to select appropriate transducer and sensors as per required	Apply
CO2	Students will get acquainted with different DAS	Analyze
CO3	Student will be able to design instrumentation system	Analyze
CO4	Student will able to understand measurement basics and select proper instrument for particular measurement of electrical parameter	Apply

Description:

This course aims to impart fundamental knowledge of different types of sensors and Transducers .and Applied knowledge of signal conditioning Instrumentation amplifiers S,Data acquisition system, Different Display devices Signal generators ,Analyzers Different dc and AC Bridges.. Students will be expected to communicate knowledge to society and industry.

Prerequisites:	1	Students should have knowledge of Fundamental Electronics and different components,
	2	Students should have knowledge of laws in basic electronics.

Course Contents		
Unit No:1	**Introduction to Measurement:** Introduction,PerformanceCharacteristics,StaticCharacteristics,Errorin Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Electrical Standards, Atomic Frequency and Time Standards.	**7 Hrs.**
Unit No:2	**Transducers :** Definition, Various Types of Transducers, Classification of Transducers, Selection Factors and General Applications of Transducers, Detailed Study of Transducers: (i) Displacement (ii) Flow (iii) Pressure (iv) Temperature (v) Force and Torque (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers: Shaft Encoder	**7 Hrs.**
Unit No:3	**Sensors:** Proximity Sensors, optical Sensors, IR sensors, Piezo – electric sensors Smart Sensors: Fiber optic sensors, Film sensors, Nano sensors, Electrochemical sensors, biosensors, MEMS	**6 Hrs.**
Unit No:4	**Bridges:** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge& Schering Bridge	**6 Hrs.**
Unit No:5	**Signal Conditioning & Data Acquisition System:** Introduction, AC & DC Signal Conditioning, , Instrumentation Amplifier, Isolation And Programmable Gain Amplifier, Grounding And Shielding, principles and working of different types of ADC and DAC. Digital voltmeters- Introduction, Types of DVM,general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter , Q meter.	**7 Hrs.**
Unit No:6	**Measurement & Display Devices:** CRO: Dual Beam, Dual Traces Sampling, Digital storage, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators, LED, LCD, Graphics Display, Signal Generators, Function generators. Spectrum analyzer, logic analyzer	**7 Hrs.**

Text Books:	
1	"A course in Electrical, Electronics measurement and Instrumentation", A.K.Sawhney,
2	"Electronic Instrumentation", H. S. Kalsi McGraw-Hill, 3rd Edition

Reference Books:	
1	"Electronic Instrumentation and Measurement Techniques", Welfrick Cooper,
2	"Electronic Instrumentation and Measurements", David A Bell, Oxford, 3rd Edition
3	"Instrumentation for Engineering Measurements", James W Dally, Wiley,2nd Edition

23UGMDM1ET306L- DIGITAL ELECTRONICS

Lectures	**:** 2 Hrs/Week	**Evaluation Scheme**	
Credit	**:** 2	**ISA**	**:** 50 Marks

Course Objectives:	
The course aims to make the student understand :	
1	Various number systems and their arithmetic, all types of codes.
2	Digital and analog Systems, logic gates.
3	Implementation of logical operations and equations using logic gates.
4	Logic equation representation and reduction.

Course Outcomes: After the completion of the course the student should be able to:		**Cognitive level**
1	Understand various number systems and codes.	Understand
2	Understand the fundamental concepts and techniques used in digital electronics.	Understand
3	Illustrate reduction of logical expressions using Boolean algebra.	Apply
4	Classify different logic families, semiconductor memories	Remember

Description of course

The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design. To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits. To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems. The course will help in design and analysis of the digital circuit and system.

Prerequisites:- Logic gates, Number systems

Course Contents		
Unit No:1	**Number Systems and Codes:-** Number Systems:- Decimal, Binary, octal, Hexadecimal Number System conversions, Binary arithmetic, signed binary number, compliments of number, Subtraction using compliments, Hexadecimal Arithmetic, Binary coded decimal(BCD),BCD addition, BCD subtraction, Codes:- Weighted code, Non weighted code, Alphanumeric code.	**6 Hrs.**
Unit No:2	**Fundamentals of digital syetms:-** Analog system and digital system, Advantage of digital systems, Limitation of digital systems, Comparison of analog and digital systems, Digital principle. Logic gates:- Basic gates, Derived gates, NAND and NOR gate as universal gate.	**6Hrs.**
Unit No:3	**Boolean equations :-** Implementation of logic function using gates, NAND and NOR implementations. Variable and literals, Standard form of Logic expression(SOP and POS), Canonical and standard forms:- Minterm, Canonical form for SOP equation, converting product term to minterm, Maxterm, Canonical POS, Converting sum term to maxterm. Canonical equation from truth table, truth table from canonical equation.	**8 Hrs.**
Unit No:4	**Simplification of logical equations:** Need of reduction of expressions , Boolean Algebra: Demorgans Theorem, Boolean laws, Boolean theorems, proofs of some theorems, reduction of Boolean expressions, Introduction to Karanaugh Map.	**6 Hrs.**
Unit No:5	**Digital Logic Families:** Classification and Characteristics of digital Logic Families: TTL logic, CMOS logic. Interfacing CMOS and TTL	**4Hrs.**

Text Books:

1	P. Raja, "Digital Electronics", Scitech Publication, 2nd Edition
2	Anand Kumar, "Fundamentals of Digital Circuits", Prentice Hall of India, 1st Edition.

Reference Books:

1	M. Morris Mano, "Digital Logic and Computer Design", Prentice Hall of India, 4 th Edition.

23UGEEC1ET3071L - INDUSTRIAL MANAGEMENT (EEC1)

Lectures	**:**	**2** Hrs/Week	**Evaluation Scheme**
Credit	**:**	**1**	**ISA : 25 Marks**

Course Objectives:	
The course aims :	
1	To familiarize the students with the concepts of Management
2	To relate the concepts of management with industrial organizations
3	To explain the factors affecting productivity and how productivity can be increased in an Industrial undertaking.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand the concepts of Management	Understand
CO2	Gain basic understanding of management and to relate the concepts of management with industrial organizations and manage organizations efficiently	Remember
CO3	Have the basic knowledge of production management and make decisions proficiently	Understand
CO4	Have the knowledge in maintaining better human relations in the organizations	Analyze

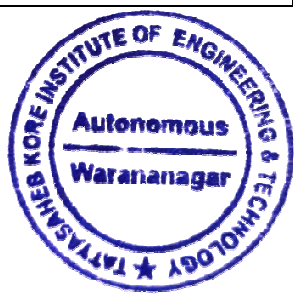
Description:		
Technicians of Electronics & Telecommunication engineering disciplines are expected to work during most of their career at middle level. They are also expected to deal with workforce and management problems. In the present era of competition, optimum utilization of the resources with achieving higher productivity is essential for any industry to survive. Quality and cost controls are also other important factors which contribute to the day to day supervision issues.		
Prerequisites:		Knowledge of English Communication and Discipline Courses

Course Contents		
Unit No:1	**Management:** Functions of management – Planning, Organizing, Staffing, Directing Controlling and Coordinating, Levels of management, Role of Manager, Skills of manager, – F.W. Taylor's scientific management and Henry Fayol's principles of management	**6 Hrs.**
Unit No:2	**Organization:** Meaning of Organization, Principles of organization, Departmentalization, **Communication**: Importance, purpose and forms of communication. Barriers to communication	**8 Hrs.**
Unit No:3	**Forms of business organizations**: Salient features of Sole proprietorship, Partnership, Joint Stock Company, Private limited company and Public limited company, Government enterprises and Co-operative societies	**8 Hrs.**
Unit No:4	**Production operations management:** Production planning and control, Plant location and factors affecting plant location, Plant layout and types of layout (in brief).	**8 Hrs.**
Unit No:5	**Human Resources Management:** Basic functions of human resource management. Manpower planning, Recruitment, Selection, Training and Development, Placement, Compensation and Performance appraisal. (	**6 Hrs.**

Text Books:	
1	"Principles of Management" , P.C. Tripathi, P.N.Reddy, Fourth Edition, Tata Mc Graw Hill Companies, New Delhi (2008) (Units Covered 1,2)
2	"Managerial Economics and Financial Analysis", A.R. AryaSri, TMH Publications, new Delhi, (2014) (Units covered – 3)
3	"Industrial Organization & Engineering Economics", S.C. Sharma and Banga T. R.,khanna Publications, Delhi-6. (2006) (Units covered – 4,5)

Reference Books:	
1	"Industrial Engineering and Management", O.P. Khanna, Dhanpat Rai and Sons.

List of learning websites :	
	1. www.youtube.com/watch?v=SF53ZZsP4ik **2. www.youtube.com/watch?v=iPZlQ3Zx5zc**



23UGVEC1E3081T- PROGRAMMING LAB.-I (C++) (VEC1)

Lectures : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25

Course Objectives: The course aims to :	
1	Introduce the fundamental principles of programming using C++ with focus on both procedural and object-oriented paradigms.
2	Provide understanding of key programming concepts such as functions, arrays, pointers, dynamic memory, and file handling.
3	Develop the ability to implement object-oriented solutions using classes, inheritance, and polymorphism.
4	Enable students to use in-built and standard library functions to solve engineering problems.

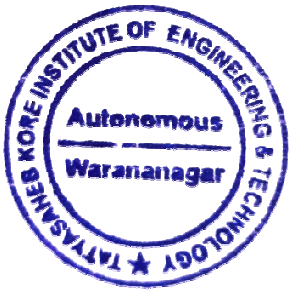
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Explain the basics of C++, including its history, applications, and structure of programs.	Understand
CO2	Develop C++ programs using control structures, functions, arrays, and pointers.	Apply
CO3	Implement object-oriented concepts such as classes, constructors, inheritance, and polymorphism.	Apply
CO4	Demonstrate file handling, exception handling, and usage of in-built functions in problem solving.	Apply

Description:

This course introduces students to programming using C++, beginning from the basics and advancing toward object-oriented programming. It covers syntax, control structures, functions, arrays, pointers, dynamic memory allocation, classes and objects, constructors/destructors, inheritance, polymorphism, file handling, and standard libraries. Emphasis is placed on writing structured and reusable code with applications relevant to electronics and communication domains.

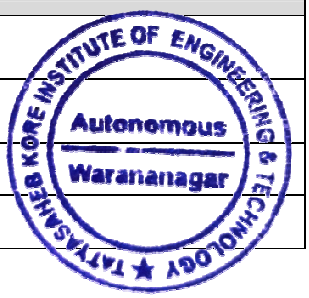
Prerequisites:	1	Basic understanding of programming logic and any introductory language.



Course Contents		
UnitNo:1	**Introduction to C++ Programming** Definition of C++, History, Features, and Applications, why C++ is still used today, Structure of a C++ Program, File Extensions, Editors, and Compilers (Turbo C++, GCC, Clang, Visual Studio), Compilation and Execution Process Variables, Constants, Data Types, Input and Output using cin and cout Operators and Expressions, Conditional and Looping Statements (if, switch, while, for)	**5 Hrs.**
UnitNo:2	**Functions, Arrays, and Pointers** Functions: Definition, Declaration, and Calling, Function Overloading and Default Arguments, Scope and Lifetime of Variables, Arrays: 1D and 2D Arrays, Array Passing to Functions, Pointers: Declaration, Initialization, Arithmetic, Pointers and Arrays, Pointers to Functions Dynamic Memory Allocation (new, delete), malloc() vs new	**6 Hrs.**
UnitNo:3	**Object-Oriented Programming in C++** Basics of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism, Classes and Objects: Declaration, Definition, Instantiation, Access Specifiers: Public, Private, Protected, Member Functions (Inside and Outside), Inline Functions, Static Members, Constructors (Default, Parameterized, Copy), Constructor Overloading, Destructors, Order of Invocation, this Pointer, Constant Functions and Friend Functions	**7Hrs.**
UnitNo:4	**Inheritance and Polymorphism** Types of Inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid Constructors and Destructors in Inheritance, Function Overriding, Virtual Functions, Abstract Classes, Pure Virtual Functions, Operator Overloading: Unary and Binary, Friend Operator Functions, Object Slicing and Virtual Destructors	**7 Hrs.**
UnitNo:5	**Advanced Programming Concepts** Structures and Unions, Introduction to Templates (Function Templates, Class Templates), Namespaces, Introduction to STL: Vectors and Iterators, Basic Exception Handling: try, catch, throw, Standard Exception Classes	**6Hrs.**
UnitNo:6	**File Handling and Library Functions** File Streams: ifstream, ofstream, fstream, File Operations: Open, Read, Write, Close, File Modes, File Pointers (seekg, tellg), Binary File Handling, In-Built Math Functions: pow(), sqrt(), abs() etc., String and Character Functions (strlen(), strcpy(), isalpha() etc.), Introduction to String Class	**5Hrs.**

Text Books:	
1	**E. Balagurusamy**, *Object-Oriented Programming with C++*, McGraw Hill, 8th Edition.
2	**Bjarne Stroustrup**, *The C++ Programming Language*, Addison Wesley, 4th Edition.

Reference Books:	
1	Robert Lafore, *Object-Oriented Programming in C++*, Sams Publishing
2	Herbert Schildt, *C++: The Complete Reference*, McGraw Hill
3	Stanley B. Lippman et al., *C++ Primer*, Pearson
4	S. B. Kishor, *Let Us C++*, BPB Publications



23UGCEPET309L – ELECTRONICS ENGINEERING PRACTICE (CEP/FP)

Lectures : 1 Hrs/Week
Practical : 2 Hrs/Week
Credit : 2

Evaluation Scheme
ISA : 25 Marks

Course Objectives: The course aims :	
1	To provide students hands on experience on, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation etc. thereby enhancing the skill and competency part of technical education
2	To create an Industrial environment and culture within the institution.
3	To inculcate innovative thinking and practice based learning and thereby preparing students for their final year project.
4	To set up self-maintenance cell within departments to ensure optimal usage of infrastructure facilities.

Course Outcomes:

COs	At the end of successful completion of the course the student willbe able to	Blooms TaxonomyLevel
CO1	Choose, Initiate and manage a minor project	Understand
CO2	Propose research problem and present it in a clear and distinct manner through different oral, written and design techniques.	Apply
CO3	Construct the circuit using hardware and/or software.	Create
CO4	Execute the project and comment upon the results of it.	Analyze

Description:

A project group shall consist of normally 3 students per group. The mini project will involve the design, construction, and debugging of an electronic system approved by the department. Each student should conceive, design and develop the idea leading to a project/product. The theme of the project should be based on courses studied in SY using discrete components/ operational amplifier/ digital IC/microprocessor etc. Each student must keep a project notebook/logbook. The project notebook will be checked periodically throughout the semester, as part of in-semester-evaluation. The student should submit a soft bound report at the end of the semester. The final product as a result of mini project should be demonstrated at the time examination

Prerequisites	1	Knowledge of engineering mathematics , electronics devices & circuits, digital systems , communication , Electrical circuits , linear integrated circuits, microprocessor etc.

Text Books:

1	"Electronics Projects For Dummies", by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006
2	"Make: Electronics", by Charles Platt, Published by Maker Media, 2015
3	Electronics for you subscription

23UGPCCET301T- ENGINEERING MATHEMATICS – III (Tutorial)

Tutorial : 1 Hr/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks

Course Objectives: The course aims to :	
1	To develop mathematical skills and enhance thinking power of students
2	To give the knowledge to the students of Linear Differential Equations, Laplace transforms, Fourier series, probability, Vector Differential Calculus with an emphasis on the application of solving Engineering Problem.
3	To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Use of Linear Differential Equations and vector differentiation to find directional derivatives, curl and divergence of vector field.	Understanding, Application
CO2	Use Laplace and Inverse Laplace to solve linear differential equations	Understanding
CO3	Develop Fourier series expansion of a function over the given interval	Understanding, Application
CO4	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.	Applying

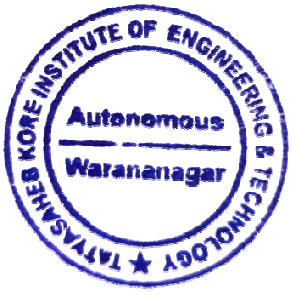
Description:

Engineering Mathematics course is offered as the basic science course. This course contains Mathematical methods and techniques that are typically used in engineering to solve complex engineering problems. This course has six units namely i) Linear Differential Equations(LDE) and its Applications ii) Vector Differential Calculus iii) Laplace Transformand iv) Inverse Laplace Transform and its Applications v) Fourier Series vi) Probability Distribution

Prerequisites:	1	Trigonometric identities and Logarithmic identities
	2	Differentiation and integration formulae
	3	Basic knowledge of probability.

Tutorials:

Course Contents			
Number	**Tutorial Topic**	**Hrs**	**Bloom's Taxonomy**
1	To solve Linear Differential equations with constant coefficients	**1**	Understanding
2	Application of LDE to electrical circuit	**1**	Application
3	To find directional derivatives	**1**	Application
4	To find Divergence , Curl of vector function	**1**	Understanding
5	To find Laplace Transform by using First shifting and multiplication by t property	**1**	Understanding
6	To find Laplace Transform by using division by t property	**1**	Understanding
7	To find Inverse Laplace by using partial fraction method and convolution therom	**1**	Understanding
8	To solve Linear Differential equation by using Laplace Transform	**1**	Application
9	To find Fourier series of a function in the interval of length 2	**1**	Understanding
10	To find Half Range Fourier sine and Cosine series	**1**	Understanding
11	To find Probability by using Binomial Distribution	**1**	Application
12	To find Probability by using Poisson, Normal Distribution	**1**	Application



23UGPCCET302LP- ELECTRONIC DEVICES & CIRCUITS –I LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

Course Objectives: The course aims to :	
1	Provide an introduction and basic understanding of Semiconductor Devices viz. diodes and BJT, JFET.
2	Provide basic analog electronic circuit design techniques using diodes and bipolar junction transistors and to develop analytical skills.
3	Develop student ability to apply basic engineering sciences to understand the Operation & analysis of electronic circuits using diodes and bipolar junction transistors.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Describe and design electronic circuits such as rectifiers & unregulated power supply.	Knowledge, Application
CO2	Solve the problems of electronic circuit design such as regulated power supply.	Analysis
CO3	Analyze & Design LPF, HPF, Clipper, Clampers, Multipliers	Knowledge
CO4	Explain operation of BJT & FET Biasing circuit.	Application
CO5	Summarize the hybrid model of transistor and analyze the transistor amplifier (CE, CB, and CC) using h-parameters.	Knowledge
CO6	Analysis of CE Amplifier for low frequency & High frequency response for sinusoidal & square wave input.	Application

Description:

Electronics Device and Circuit-I course is a core electronics course. This course describes the concept of electronics circuit design. It gives the concept of different electronics circuit for their detail operation and working principle. Also, it describes the specifications of devices and its use for different applications.

Prerequisites:	1	Semiconductor Physics
	2	Basic Electronics
	3	Electronics Measurement

List of Experiments			
Minimum 09 experiments + 01 Simulation:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment as per Bloom's**
1	Design and study of Low pass filter a. Frequency response (sinusoidal) b. integrator (Square wave input)	2	Knowledge
2	Design and study of High pass filter a. Frequency response (sinusoidal) b. Differentiator (Square wave input)	2	Knowledge
3	Analysis of different types of clipper circuits.	2	Analysis
4	Analysis of different types of clamping circuits.	2	Analysis
5	Study of full wave rectifier with capacitive filter.	2	Knowledge
6	Study of full wave rectifier with inductive filter.	2	Knowledge
7	Design and analysis of zener shunt regulator	2	Knowledge
8	Design and analysis of transistorized shunt regulator	2	Application
9	Demonstration of emitter follower regulator	2	Application
10	Demonstration of series pass voltage regulator	2	Application
11	Determination of H-parameter for CE configuration using input and output characteristics.	2	Application
12	Simulation of FWR using C-filter	2	Application
13	Simulation of Single stage RC-Coupled Amplifier	2	Application
14	PCB Design a. Design of FWR (Different output voltages for different groups) with C filter. b. Design of Single Stage RC Coupled Amplifier (Different voltage Gain for different groups).	To be Completed in Extra Time	Knowledge Application

23UGPCCET303LP- DIGITAL ELECTRONICS AND MICROPROCESSOR LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

Course Objectives:	
The course aims to make the student understand :	
1	The fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
2	Boolean algebra, Karnaugh maps and its application to the design and characterization of digital circuits.
3	To analyze logic processes and implement logical operations using combinational logic circuits.
4	The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Use the basic logic gates and various reduction techniques of digital logic circuit.	Remembering
CO2	Analyze, design and implement combinational logic circuits.	Apply
CO3	Analyze, design and implement sequential circuits.	Apply
CO4	Explain microprocessor architecture and its instruction set	Understand
CO5	Explain interfacing of devices to microprocessor	Understand
CO6	Design Microprocessor based Systems	Create

Description:

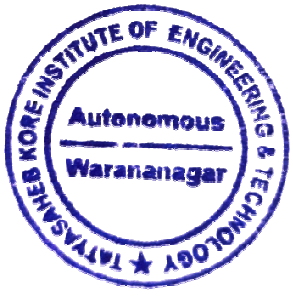
This is very important core course offered in Electronics and Telecommunication Engineering. Embedded Systems, VLSI Design, Robotics Systems, Communication Systems etc. are using Digital Systems like microprocessors and microcontrollers. Also to design any electronics system digital electronics is required. To understand digital transformation and design any System, this course plays very important role.

Prerequisites:	1	Logic gates, Number systems

List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Realization of basic gates using universal gates	2	Knowledge
2	Design of Half adder and full adder using logic gates	2	Experiment
3	Design of Half subtractor and full subtractor using logic gates	2	Experiment
4	Design of 8:1 MUX using IC 74151	2	Demonstrate
5	Design 1:8 DEMUX using IC 74138	2	Experiment
6	Study of basic gates using TTL and CMOS IC	2	Describe
7	Study of D FF and JK FF	2	Describe
8	Design and test counter using Flip-flop	2	Demonstrate
9	Design and test MOD 4 counter using Flip-flop	2	Construct
10	Experiment Based on Arrays:- (Minimum one) Exchange, Addition, Finding Minimum / Maximum, Ascending /Descending, etc	2	Understand
11	Experiment Based on Arithmetic and Logical Operation:- (Minimum one) Multi-digit Addition, Multiplication / Division, Finding Even / Odd Numbers, Factorial, Fibonacci Series	2	Understand
12	8255 Based Experiments: (Minimum one) Display interface using 8255,Stepper motor interface, ADC, DAC	2	Apply

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2											1	3	2
CO2	1		3										3	3	3
CO3		2		3	3								2	1	3
CO4	1												2	1	2
CO5	1		2										3	3	2
CO6				2	3								1	3	1



23UGVEC1 ET308T- PROGRAMMING LAB.-I (C++) LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
POE : NA

Course Objectives: The course aims to :	
1	Introduce the fundamental principles of programming using C++ with focus on both procedural and object-oriented paradigms.
2	Provide understanding of key programming concepts such as functions, arrays, pointers, dynamic memory, and file handling.
3	Develop the ability to implement object-oriented solutions using classes, inheritance, and polymorphism.
4	Enable students to use in-built and standard library functions to solve engineering problems.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Explain the basics of C++, including its history, applications, and structure of programs.	Understand
CO2	Develop C++ programs using control structures, functions, arrays, and pointers.	Apply
CO3	Implement object-oriented concepts such as classes, constructors, inheritance, and polymorphism.	Apply
CO4	Demonstrate file handling, exception handling, and usage of in-built functions in problem solving.	Apply

Description:

This course introduces students to programming using C++, beginning from the basics and advancing toward object-oriented programming. It covers syntax, control structures, functions, arrays, pointers, dynamic memory allocation, classes and objects, constructors/destructors, inheritance, polymorphism, file handling, and standard libraries. Emphasis is placed on writing structured and reusable code with applications relevant to electronics and communication domains.

Prerequisites:	Basic understanding of programming logic and any introductory language.

List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Write a program to perform arithmetic operations and use `if-else`, `switch-case`, and loops	2	Apply
2	Write a program to check whether a number is prime and generate Fibonacci series	2	Analyze
3	Write a program using user-defined functions to calculate factorial and check for palindrome	2	Apply
4	Write a program to implement function overloading for calculating area of different shapes	2	Analyze
5	Write a program to demonstrate pointer arithmetic and array-pointer relationship	2	Analyze
6	Write a program using dynamic memory allocation for 1D array	2	Apply
7	Write a program to define a class with constructor, destructor, `this` pointer, and static data members	2	Understand
8	Write a program to demonstrate friend function accessing private members of two classes	2	Analyze
9	Write a program to implement single and multiple inheritance using virtual base class	2	Apply
10	Write a program to overload unary and binary operators	2	Analyze
11	Write a program using class and function templates, and demonstrate namespaces	2	Create
12	Write a program to handle divide-by-zero exception and perform file I/O with student data	2	Evaluate

Second Year B. Tech.

(Electronics & Telecommunication Engg.)

Second Semester Detailed Syllabus

23UGPCCET401- ELECTRONIC DEVICES & CIRCUITS-II

Lectures	**:**	3 Hrs/Week	**Evaluation Scheme**
Credit	**:**	2	**ISE : 40 Marks**
			ESE : 60 Marks

Course Objectives: The course aims to :	
1	Provide an introduction and basic understanding of feedback amplifiers, power amplifiers, oscillators, multivibrators.
2	Develop student ability to apply basic engineering sciences to understand the operation &analysis of electronic circuits using diodes, bipolar junction transistors and field effect transistors
3	Provide analog electronic circuit design techniques using diodes, bipolar junction Transistors and field effect transistors, and to develop analytical skills.

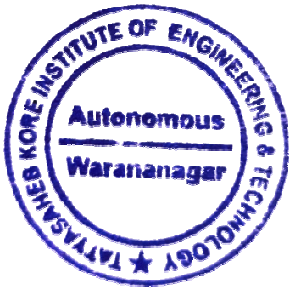
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Design Multistage Amplifier	Knowledge, Application
CO2	Analyze Feedback Amplifier	Analysis
CO3	study Power Amplifier	Knowledge
CO4	Describe & Design Different types of Oscillators using BJT	Application
CO5	Describe & Design Different types of Multivibrators using BJT	Knowledge
CO6	Study IC voltage Regulators	Application

Description:

Electronics Device and Circuit-II course is a core electronics course. This course describes the applications of electronics circuit design. It gives the detail design concept of different electronics circuit for their detail operation and working principle.

Prerequisites:	1	Electronics Devices and Circuits-I



Course Contents		
Unit No:1	**Multistage Amplifiers:** Need of cascading, Parameter evaluation such as Ri ,Ro, Av, Ai & bandwidth for general multistage amplifier, Design of two stage RC coupled amplifier, Direct coupled amplifier using BJT.	**6 Hrs.**
Unit No:2	**Feedback Amplifiers :** Introduction of feedback, reasons for negative feedback. Analysis of Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers, Design of two stage Voltage series feedback amplifier.	**8 Hrs.**
Unit No:3	**Power Amplifiers:** Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic / nonlinear distortion, amplitude distortion using Three point method. analysis and design of Class A single ended transformer coupled amplifier& class A Push pull amplifiers, Class B amplifier & class B push pull amplifier , crossover distortion, class AB Push pull amplifiers. Complementary symmetry push pull power amplifier.	**10 Hrs.**
Unit No:4	**Oscillators:** Barkhausen's criteria, Frequency and amplitude stability, Classification, RC oscillators : analysis & design of RC phase shift & Wein bridge oscillator using BJT. LC oscillators: analysis & design of Colpit's & Hartely's oscillators using BJT, Crystal oscillator.	**8 Hrs.**
Unit No:5	**Multivibrators:** Transistor as a switch, Different transistor switching parameters, overdrive factor, classification of multivibrators, Analysis and design of collector coupled -Astable, Monostable, fixed bias and self-bias Bistable multivibrator and Schmitt trigger using BJT considering overdrive factor. Triggering circuits for Multivibrators	**10 Hrs.**
Unit No:6	**IC voltage regulator** Study and design of regulators using IC's :78XX, 79XX,LM723,LM317, LM337.	**6 Hrs.**

Text Books:	
1	"A Monograph on Electronics Design Principles", N.C. Goyal & R.K. Khetan," Khanna Publishers
2	"Electronic devices & circuits", Allen Mottershed, Prentice- Hall India
3	"Electronic devices & circuits", G. K. Mittal,
4	"Applied Electronics", R.S.Sedha,

Reference Books:	
1	"Electronic devices & circuits", David A. Bell, Oxford University
2	"Electronic devices & circuits", Salivahanan, N Sureshkumar,Tata McGraw Hill Publication
3	"Electronic devices & circuit theory", Robert L. Boylsted, Louis Nashelsky, Pearson Education

23UGPCCET402- COMMUNICATION ENGINEERING

Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives:	
The objective of the course is to:	
1	Understand the concept of analog communication systems and its types
2	Understand basic concepts of analog modulation and demodulation schemes
3	Study strengths and weakness of various communication systems.
4	Apply knowledge of analog communications systems under the presence of noise

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Understand the concept of analog communication systems and its types.	Understanding Knowledge,
CO2	Understand the baseband transmission and reception	Knowledge, Application
CO3	Evaluates problems on analog modulation and demodulation schemes	Knowledge, Application
CO4	Analyze analog communications systems under the presence of noise.	Analyze,

Description:		
Course deals with understanding the principles of Analog Communication, study of different types of Pulse modulation techniques, Noise in communication system .It describes the fundamentals of baseband transmission, modulation techniques.		
Prerequisites:	1	Electronic devices & circuits
	2	signals & system
	3	Basics of electronic communication

Course Contents		
Unit No: 1	**Amplitude Modulation:** Basic block diagram of communication system, Need for modulation, channel, frequency spectrum, time and frequency domain signals, Amplitude Modulation principles, AM envelope, frequency spectrum & BW, Modulation index, % modulation, AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns. Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method Vestigial sideband(VSB)	**8 Hrs.**
Unit No: 2	**Angle Modulation:** Instantaneous frequency, Concept of angle modulation, frequency spectrum, Narrowband & Wide Band FM, Modulation Index, Bandwidth, Phase modulation, Generation of FM (Direct & Indirect Method)	**6 Hrs.**
Unit No: 3	**Noise:** Sources of noise, Types of noise White noise, shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise, signal to noise ratio, Noise Figure, Noise Temperature.	**4 Hrs.**
Unit No: 4	**AM Receiver:** Simplified block diagram of AM receiver, receiver parameters: Sensitivity Selectivity, fidelity, Types of AM receiver: TRF and superheterodyne (block diagram), AM detection types: using diode detector, distortion in diode detector. Automatic Gain Control (AGC).	**6 Hrs.**
Unit No: 5	**FM Receiver:** Double conversion FM receiver block diagram, FM demodulator, tuned Circuit frequency discriminators, slope detectors, fosters seeley discriminators, ratio detectors	**6 Hrs.**
Unit No: 6	**Pulse Modulation :** Introduction, Sampling theorem: Occurrence of aliasing error, PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery, PWM, Uses of PWM, PPM, Generation of PAM, Generation of PWM, Generation of PPM	**6 Hrs.**

Text Books:	
1	"Electronic Communications", George Kennedy, Tata McGraw Hill.
2	"Electronics Communication System", Wayne Tomasi Fundamentals through Advanced, Pearson Education, 5th Edition.
3	"Analog Communication", V. Chandra Sekar, OXFORD University press.

Reference Books:	
1	"Analog and Digital Communication", B.P. Lathi, OXFORD University press.
2	"An introduction to analog & digital communications", Simon Haykin, John Wiley & Sons
3	"Communication System-Analog & Digital" , R. P. Singh, S D Sapre, Tata McGraw Hill Publication, 3rd Edition
4	"Electronic Communication Systems", Roy Blake, CENGAGE learning, 2nd Edition
5	"Principals of electronic communication system", Louis E. Frenzel, Tata McGraw Hill Pub.

23UGPCCET403- LINEAR INTEGRATED CIRCUITS

Lectures : 3 Hrs/Week
Credit : 2

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to :	
1	Understand need of differential amplifier To study the fundamentals /basics of differential amplifier by using transistor.
2	Study internal circuit & operation with different stages of op-amp.
3	Illustrate waveform generators and Timer using special ICs.
4	Study different PLL and VCO ICs and its applications.

Course Outcomes:		
COs	**Upon successful completion of this course, the students will be able to:**	**Blooms Taxonomy**
CO1	Distinguish and design differential amplifiers used in linear integrated circuits.	Analyzing
CO2	Design amplifiers and active filters.	Applying & creating
CO3	Identify and design different linear and non linear application using op-amp	Applying
CO4	Illustrate waveform generators and Timer using special ICs.	Applying
CO5	Describe different PLL and VCO ICs and their applications.	Understanding

Description:

This course deals with the study of basic transistor configuration used as basic building block for integrated circuit called op-amp. It aims t0 establish the firm understanding of linear and non linear application of op-amp. This course also focuses on design aspects of active filters, waveform generators and PLL circuits

Prerequisites:	1	The Basic Concept of circuit theory
	2	Basic Knowledge of electronics devices

Course Contents		
Unit No:1	**Introduction to op-amp:** Block diagram of op-amp in detail, Differential Amplifier configurations, Differential amplifier analysis (AC and DC) for dual-input balanced-output configuration, level shifter, current mirror circuits, ideal parameters and Practical parameters of op-amp and their comparison. (Numerical expected)	**8 Hrs.**
Unit No:2	**Op-amp configurations & frequency response:** Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency response of both configuration. slew rate equation	**7 Hrs.**
Unit No:3	**Applications of Op-amp:** Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Study of comparator, Schmitt Trigger, Window Detector, Peak Detectors, Sample & Hold Circuits.	**7 Hrs.**
Unit No:4	**Active Filters:** Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter (Numerical expected)	**6 Hrs.**
Unit No:5	**Waveform Generators:** Analysis & Design of Square wave generator, Triangular wave generator, Saw tooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Quadrature oscillator.	**6 Hrs.**
Unit No:6	**Special linear ICs and its Industrial applications:** Introduction, block diagram, operating principle and applications of IC555,IC 565,High precision performance operational amplifier (OP177), Instrumentation amplifier (AD620),Function generator (IC8038).	**7 Hrs.**

Text Books:	
1	"Op Amps and Linear Integrated Circuits", Ramakant A. Gaikwad, Pearson Education 2nd and latest edition
2	"OP-AMPS and Linear Integrated Circuits", Sanjay Sharma, S K Kataria and Sons, 2nd Edition.

Reference Books:	
1	" Linear Integrated Circuits", S Salivahanan, V S Kanchana Bhaaskaran, Tata McGraw-Hill, 7th Edition
2	"Operational Amplifiers and Linear ICs", David Bell, Third edition, Oxford University Press, 3rd Edition.
3	"Linear Integrated Circuits- Analysis, Design &Applications", B. Somanathan Nair, Wiley India.
4	Linear IC Datasheets

23UGPCCET404- CONTROL SYSTEM ENGINEERING

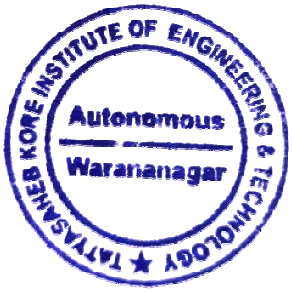
Lectures : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to :	
1	To provide an introduction and basic understanding of Control System
2	To develop time & frequency domain analysis
3	To analyze& compare different control systems and understand the concept of stability & state space variables

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Apply knowledge of mathematics, science, and engineering to design, analyze and control the different systems	Apply
CO2	Explain time & frequency domain analysis for different control systems	Analyze
CO3	Demonstrate & compare different control systems and can check system stability.	Analyze
CO4	Describe state variables Design model for control system	Apply

Description:		
This course aims to impart fundamental knowledge of different types of control systems and Applied knowledge of Electrical ,mechanical systems and their mathematical modeling .Transfer function ,Time domain analysis and frequency domain analysis, steady state error and error constants ,Stability analysis root locus ,bode plot polar plot ,Basics of compensators and controllers, Also students should get knowledge of State model and state variables.		
Prerequisites:	1	Students should have knowledge of Fundamental Electronics and different components,
	2	Students should have knowledge of Mathematics



Course Contents		
Unit No:1	**Introduction** : Classification of control system, Effects of feedback, Mathematical models – (Mechanical & Electrical systems) Differential equations, Transfer function , Block diagram algebra – Block diagram reduction, Representation by Signal flow graph – Reduction using Mason's gain Formula.	**7 Hrs.**
Unit No:2	**Time Response Analysis :** Standard test signals-Time response of first & second order system-Design specification of 2^{nd} order system & error compensation, Characteristic Equation of Feedback control systems, Transient response of second order system- Time domain specifications, Steady state response- Steady state error and error constants.	**7 Hrs.**
Unit No:3	**Stability Analysis In S-Domain:** The concept of stability – Routh's stability criterion – limitations of Routh's stability Root Locus Technique: The root locus concept – construction of root locieffects of adding poles and zeros to G(s) H(s) on the root locus.	**6 Hrs.**
Unit No:4	**Frequency Response Analysis:** Introduction, Frequency domain specifications-Bode plots, Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability Criterion, Nyquist plot & stability analysis.	**7 Hrs.**
Unit No:5	**Compensators And Controllers:** Compensation techniques –Lag, Lead, Lead-Lag Controllers design in frequency Domain, ON-OFF Controller, PID control system. Programmable Logic Controller (PLC)	**7 Hrs.**
Unit No:6	**State Space Analysis:** Concept of state, state variable & state model, state model for linear continuous time systems, Transfer function from state model, Computation of state transition matrix, Controllability & Observability.	**6 Hrs.**

Text Books:	
1	"Control Systems Engineering", I .J. Nagrath and M. Gopal, Anshan Publishers, 5^{th}Edition.
2	"Control System Engineering", A.Anandkumar, PHI Publication 2^{nd}Edition.
3	"Control System Engineering", R.Anandnatarajan,,P.Rameshbabu, Scitech Publications.

Reference Books:	
1	"Control System Engineering", Norman S Nise, Wiley Publication, 8^{th}Edition.
2	"Control System Theory & application", SanarjjetGhosh , Pearson Education, 1st Edition.
3	"Automatic Control System", Kuo B.C., Prentice Hall Publication, India

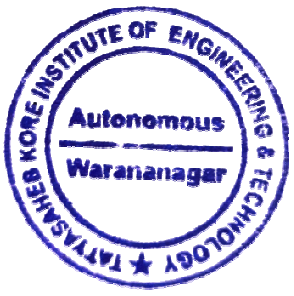
23UGMDM2ET405L- DIGITAL SYSTEM DESIGN

Lectures : 2Hrs/Week **Evaluation Scheme**
Credit : 2 **ISA : 50 Marks**

Course Objectives: The course aims to :	
1	Illustrate the simplification of Algebraic equations using K-map & Quine Mc-clusky methods.
2	design and optimize combinational and sequential circuits
3	Understand basic electronics circuits for various applications using digital components.
4	Understand the concepts of PLDs.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Apply minimization techniques for optimizing combinational logic	Apply
CO2	Design simple combinational logic circuits	Apply
CO3	Design and analyze simple sequential circuits	Analyze
CO4	Comprehend the digital logic families and PLDs	Understand

Description:	
The students need to learn basic concepts of digital circuits and system which leads to design of complex digital system such as microprocessors. The students need to know combinational and sequential circuits using digital logic fundamentals. The students will learn the design of combinational and sequential circuit. This is the first course by which students get exposure to digital electronics world.	
Prerequisites:	Fundamentals of digital electronics



Course Contents		
Unit No:1	**Principles of combinational logic:** Definition of combinational logic, canonical forms, non canonical form Generation of switching equations from truth tables , Karnaughmaps-3,4, variables, Incompletely specified functions (Don't care terms) Simplifying Max term equations, Quine- Mc Cluskey techniques	**5 Hrs.**
Unit No:2	**Analysis and design of combinational logic-I (Arithmetic Circuits) :** Half & full adder , Half & full, BCD adder, Binary serial & Parallel adder XS-3 Adder , Look ahead carry generator , magnitude comparator	**4 Hrs.**
Unit No:3	**Analysis and design of combinational logic-II:** Multiplexer , De multiplexer , decoder ,encoder , BCD to seven segment decoders , parity generator /checker, code converter	**6 Hrs.**
Unit No:4	**Analysis and design of Sequential logic-I:** Definition of sequential logic, Basic Bi-stable elements, Latches, Clocked SR, JK, MS J-K flip flop, D and T flip-flops, Use of preset and clear terminals. Excitation Table for flip flop, Conversion of flip flops.	**5 Hrs.**
Unit No:5	**Analysis and design of Sequential logic-II:** Application of Flip flops. Registers, Shift registers, Counters-Asynchronous and synchronous counter design, Decade Counter.	**4 Hrs.**
Unit No.6	**Programmable Logic Devices:** Introduction to Programmable Logic Devices, Read-Only Memory, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL),	**6Hrs.**

Text Books:

1	P. Raja, "Digital Electronics", Scitech Publication, 2nd Edition
2	Anand Kumar, "Fundamentals of Digital Circuits", Prentice Hall of India, 1st Edition.

Reference Books:

1	M. Morris Mano, "Digital Logic and Computer Design", Prentice Hall of India, 4 th Edition.

23UGOE1ET4061 ELECTRICAL TECHNOLOGY (Open Elective-I)

Lectures : 3 hrs/ week
Credits : 3

Evaluation Scheme:
ISE: 40 Marks
ESE: 60 Marks

Course Objectives: The course aims to enable student to :	
1	To Provide the Basic knowledge of Electrical Motors concepts used in various mechanical applications
2	To select suitable drives for different mechanical systems by considering its speed Torque characteristics.
3	To study the various concept of electrical heating and Welding.

Course Outcomes: After the completion of the course the student should be able to:		**Cognitive level**
CO1	Explain the construction, working, characteristics and speed control techniques of Dc motors.	Understand
CO2	Explain the construction, working, characteristics of Three phase Induction motors.	Understand
CO3	Explain the construction, working, characteristics and applications of fractional horse power motors	Understand
CO4	Select the suitable motor for different mechanical applications	Apply
CO5	Identify the various Electric Heating methods preferred in furnace Industries.	Analyze
CO6	Classify the Principles, working and advantages of Electric Welding Methods.	Understand

Description of course

Number of Mechanical systems requires Prime movers to get the required mechanical motion. Electrical motors are widely used for this purpose. Hence It is essential to study the concept of AC and DC motor under Mechanical Engineering Stream. Electrical Heating and welding is also integral part of Mechanical Industry, Therefore Every Mechanical Engineer should aware about this. Electrical Technology course is offered as the Fundamental science to achieve above these aspects This course contains study of various Electric motors construction, working, characteristics, speed control Techniques and applications. This course has six units namely i) DC Motor, ii) Three Phase Induction motor, iii) Fractional Horse power Motor, iv) Electric Drives, v) Electric Heating and vi). Electric Welding

Prerequisites:- Basic Electrical Engineering, &Few basic electrical components identification

Course Contents		
Unit No:1	**DC Motors:** Construction, Working, Types, Back EMF, Speed equation, Torque equation, Speed torque characteristics, and Power losses in DC. Motors. Speed control of DC Shunt and series motor.	**04 Hrs**
Unit No:2	**Three Phase Induction Motor:** Construction, Types, Working, Speed equation, Torque equation, Torque speed Characteristics, Power stages in motor, Advantages of 3- Phase Induction motor. (Numerical treatment on power stages)	**05 Hrs**
Unit No:3	**Fractional Horse Power Motors:** Construction, Working, characteristics and Applications of Single phase permanent capacitor type Induction motor, AC servo motor, DC servo motor, Stepper motor (VR type and PM type).	**05 Hrs**
Unit No:4	**Electrical Drives:** Advantages of electrical drives, Types – Individual & Group drive, Criteria for selection of motors for applications like lathe, Traction, pumps, Conveyors, Lift,etc.	**05 Hrs**
Unit No:5	**Electric Heating:** Construction and Working of - Direct & Indirect resistance Heating, Direct arc furnace, Indirect arc furnace, Horizontal Core type induction furnace, (Numerical treatment on Electrical to Heat energy conversion)	**05 Hrs**
Unit No.6	**Electric Welding:** Principle, Advantages and types of Resistance Welding. Formation and Characteristics of Electric Arc. - Effect of Arc Length.	**04 Hrs**

Text Books	
1	A Text book of Electrical Technology", Vol-II ,B. L. Theraja, S. Chand publication, 1st Edition.
2	Principles of Electrical Machines by V.K.Mehta,& Rohit Mehta. S. Chand Publishing, 2008
Reference Books	
1	A Text book of "Electrical Power system "by S. L. Uppal, DBS Publications
2	Utilization of Electric Power, R. K. Rajput, Laxmi publication (p) Ltd., 4th Edition, 2007.
3	Electrical Technology, by U. A. Bakshi , Technical Publication Pune,4th Edition , 2009.

Web Links/ Video Lectures are to be provided to Theory and Practical /ExperimentsLectures

https://nptel.ac.in/courses/108/108/108108076/#

https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee65/

https://nptel.ac.in/courses/112/107/112107090/

23UGOE1ET4061- TRANSDUCERS AND SENSORS (Open Elective-I)

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

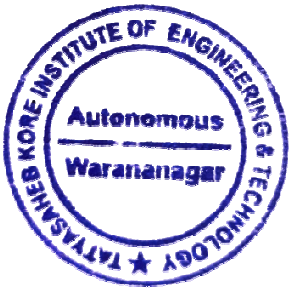
Course Objectives: The course aims to :	
1	Provide introduction to different types of Transducers with their classification, construction & application and Provide knowledge of different sensors and their applications
2	Provide knowledge of signal conditioning and instrumentation system and Provide basic knowledge of measurement system
3	Provide basic understanding of different Electronic instruments and Provide knowledge of different types of bridges

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Student will able to select appropriate transducer and sensors as per required	Apply
CO2	Students will get acquainted with different DAS	Analyze
CO3	Student will be able to design instrumentation system	Analyze
CO4	Student will able to understand measurement basics and select proper instrument for particular measurement of electrical parameter	Apply

Description:

This course aims to impart fundamental knowledge of different types of sensors and Transducers .and Applied knowledge of signal conditioning Instrumentation amplifiers S,Data acquisition system, Different Display devices Signal generators ,Analyzers Different dc and AC Bridges.. Students will be expected to communicate knowledge to society and industry.

Prerequisites:	1	Students should have knowledge of Fundamental Electronics and different components,
	2	Students should have knowledge of laws in basic electronics.



Course Contents		
Unit No:1	**Introduction to Measurement:** Introduction,PerformanceCharacteristics,StaticCharacteristics,Errorin Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Electrical Standards, Atomic Frequency and Time Standards.	**7 Hrs.**
Unit No:2	**Transducers :** Definition, Various Types of Transducers, Classification of Transducers, Selection Factors and General Applications of Transducers, Detailed Study of Transducers: (i) Displacement (ii) Flow (iii) Pressure (iv) Temperature (v) Force and Torque (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers: Shaft Encoder	**7 Hrs.**
Unit No:3	**Sensors:** Proximity Sensors, optical Sensors, IR sensors, Piezo – electric sensors Smart Sensors: Fiber optic sensors, Film sensors, Nano sensors, Electrochemical sensors, biosensors, MEMS	**6 Hrs.**
Unit No:4	**Bridges:** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge& Schering Bridge	**6 Hrs.**
Unit No:5	**Signal Conditioning & Data Acquisition System:** Introduction, AC & DC Signal Conditioning, , Instrumentation Amplifier, Isolation And Programmable Gain Amplifier, Grounding And Shielding, principles and working of different types of ADC and DAC. Digital voltmeters- Introduction, Types of DVM, general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter , Q meter.	**7 Hrs.**
Unit No:6	**Measurement & Display Devices:** CRO: Dual Beam, Dual Traces Sampling, Digital storage, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators, LED, LCD, Graphics Display, Signal Generators, Function generators. Spectrum analyzer, logic analyzer	**7 Hrs.**

Text Books:	
1	"A course in Electrical, Electronics measurement and Instrumentation", A.K.Sawhney,
2	"Electronic Instrumentation", H. S. Kalsi McGraw-Hill, 3rd Edition

Reference Books:	
1	"Electronic Instrumentation and Measurement Techniques", Welfrick Cooper,
2	"Electronic Instrumentation and Measurements", David A Bell, Oxford, 3rd Edition
3	"Instrumentation for Engineering Measurements", James W Dally, Wiley,2nd Edition

23UGVSECET407L- DATA STRUCTURE & ALGORITHMS

Lectures : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks

Course Objectives: The course aims to :	
1	To study the basic concept of data structure & it's types.
2	To understand the knowledge of linear data structure as well as relevant operations on it.
3	To understand knowledge of non linear data structure & relevant operations on it.
4	To apply knowledge of data structure applications in engineering field.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Explain the basic concept of data structure & it's types.	Knowledge, Application
CO2	Solve problems on linear data structures.	Knowledge, Analysis
CO3	Solve problems on non linear data structures.	Knowledge, Analysis
CO4	Analyze knowledge of data structure applications in engineering field.	Knowledge, Application

Description:

Data Structure and Algorithms course is offered as Basic Computer Science & Engineering course. Student should get basic knowledge of algorithms in linear and non linear data structures which will be helpful for writing programming code using any language.(C,C++,Java)

Prerequisites:	1	C Programming
	2	Mathematics
	3	Basics of Operating system
	4	Basics of Algorithms and flowcharts

Course Contents		
Unit No: 1	**Introduction & Overview:** Introduction to theory of data structures, data types, Classification of data structure, Algorithms, types of Algorithms, complexity, time space trade-off with example.	**2 Hrs.**
Unit No: 2	**Arrays, Records & Pointers:** Introduction, linear arrays, representation of linear array in memory, Algorithm for traversing linear arrays, inserting & deleting, Sorting: bubble sort, searching: linear search, binary search, Multi-dimensional arrays, Pointers: pointer arrays, Records: Record structures, representation of records in memory, parallel arrays, Matrices, Sparse matrices	**6 Hrs.**
Unit No: 3	**Linked Lists:** Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists.	**6 Hrs.**
Unit No: 4	**Stacks & Queues:** Introduction to stacks, stack as an Abstract Data type, representation. Applications of stacks, stacks & recursion, Queue, representation of queue as an array and as a linked list, circular, double ended, priority, application of queues.	**7 Hrs.**
Unit No: 5	**Trees :** Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal, reconstruction, counting number of binary trees, applications. Advanced trees: AVL trees or height balanced trees, representation, operation, Threaded binary trees, Expression trees. Multi way trees, multi way search trees, B+ trees	**7 Hrs.**
Unit No: 6	**Graphs &Hashing**: Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, Hashing, Hash functions, collision, chaining	**8 Hrs.**

Text Books:	
1	"Data structure using C", ISRD group, Tata McGraw Hill, Publication
2	"Data structures", Seymour Lipschutz, Tata McGraw Hill Publication

Reference Books:	
1	"Data structure & algorithm analysis in C", Mark Allen Weiss, Pearson Publication Education (LPE)
2	"Introduction to Data structure in C", A.N. Kathie, Pearson Publication Education (LPE)

23UGAEC1ET4081T- INDIAN LANGUAGE

Lectures	**:** 1 Hrs/Week	**Evaluation Scheme**	
Tutorial	**:** 1	**ISA**	**: 25** Marks
Credit	**:** 2		

आधुनिक भारतीय भाषा

ME-407P-मराठी भाषेतील विशेष साहित्यकृतींचा अभ्यास

अधिव्याख्याने	**:२ तास प्रति सप्ताह**	**मूल्यमापन योजना**
श्रेयांक	**:२**	**सत्रांत परीक्षा :लागू नाही**
ट्यूटोरियल	**:लागू नाही**	**सत्र मूल्यांकन :२५गुण**

उद्दिष्टे:	
१. विद्यार्थ्यांच्यात मराठी भाषा आणि साहित्याविषयी जिज्ञासा निर्माण करणे.	
२. मराठी भाषेतील प्रतिभावंत साहित्यिकांच्या कृतींचा अभ्यास करणे.	
३. मराठी साहित्याच्या वाचनाची आवड निर्माण करणे.	
४. मराठीभाषेच्या प्रचार-प्रसारासाठी विविध उपक्रम राबवणे.	
५. यांत्रिक अभियांत्रिकीतील संकल्पना मराठीभाषेतून विशद करणे.	
विधेये:	
अभ्यासक्रम यशस्वीरीत्या पूर्ण केल्यावर विद्यार्थी खालील विधेये साध्य करेल	
वि. १	**मराठीतील विख्यात साहित्याचा आणि साहित्यिकांचा धांडोळा घेईल.**
वि. २	**अभ्यासक्रमाव्यतिरिक्त इतर साहित्यिकांच्या साहित्याचा आस्वाद घेईल.**
वि. ३	**विद्यार्थ्यांच्यात अवांतर वाचनाची गोडी लागेल.**
वि. ४	**सभाधीटपणा,नाट्य, संभाषण, वक्तृत्व अश्या विविध कला अवगत होतील.**
वि. ५	**यांत्रिक अभियांत्रिकीतील संकल्पना अधिक स्पष्ट होतील.**
विवरण:	
"मराठीभाषेतील विशेष साहित्यकृतींचा अभ्यास " या विषयाचा***क्षमतावृद्धिंगतअभ्यासक्रमांतर्गत*** समावेश करणेत आलेला आहे. यांत्रिक अभियांत्रिकीतील संकल्पना मातृभाषेतून स्पष्टकेल्यास, विद्यार्थ्यांना त्या संकल्पना प्रभावीरीत्या समजण्यास मदत होते. अभियांत्रिकीच्या इंग्रजीतील शिक्षणामुळे विद्यार्थी आपल्या मातृभाषेपासून आणि पर्यायाने त्यातील साहित्यापासून दूर जाऊ शकतो. हा दुरावा कमी करणे, हा या विषयाचा मूळ उद्देश आहे. या विषयांतर्गत, **मराठीभाषा :उगम आणि विकास, विशेष साहित्यकृतींचा अभ्यास – गद्य, विशेष साहित्यकृतींचा अभ्यास –** पद्य, **मराठीरंगभूमी – एक सांस्कृतिक वारसा आणि उपक्रम** असे एकूण पाच घटक समाविष्ट करण्यात आलेले आहेत.	

संदर्भग्रंथसूची	
१	**अमृतसिद्धी: १व२**,मंगलागोडबोलेवस. ह. देशपांडे, मौजप्रकाशनगृह
२	**व्यक्तीआणिवल्ली**, पु. ल. देशपांडेमौजप्रकाशनगृह
३	**मीकसाझालो?,**प्र. के. अत्रे, परचुरेप्रकाशन
४	**स्वामी**, रणजीतदेसाई, मेहतापब्लिशिंगहाउस
५	**झाडाझडती**, विश्वासपाटील, राजहंसप्रकाशन
६	**बहिणाबाईचीगाणी**, बहिणाबाईचौधरी, सुचित्राप्रकाशन
७	**बोलगाणी**, मंगेशपाडगांवकर, मौजप्रकाशनगृह
८	**बोरकरांचीसमग्रकविता**, **खंड१व२**, बा. भ. बोरकर, देशमुखआणिकंपनी
९	**मृन्नंध**, इंदिरासंत,मेहतापब्लिशिंगहाउस
१०	**रंगमाझावेगळा**, सुरेशभट, मौजप्रकाशनगृह,

23UGEEC2ET4091L FINANCIAL MANAGMENT

Lectures	**:**	**2** Hrs/Week	**Evaluation Scheme**
Credit	**:**	**1**	**ISA : 25** Marks

Course Objectives: The course aims to make the student :	
1	Understand the Basics of Project Planning
2	Understand the Financial Estimates and projections in projects
3	Understand the Receivables Management
4	Understand the Inventory Management

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand Generation and screening of project ideas, Market ,Demand & Technical Analysis	Understand
CO2	Identify the different sources of finance and Appraisal of Loan	Remember
CO3	Describe the Receivables management	Understand
CO4	Illustrate different inventory management techniques	Analyze

Description:		
To develop competencies and abilities to work in an industrial organization by studying of the concepts like planning, organizing, directing, controlling and operation research methodologies. Idea is to change their view from job seeker to job provider by changing their abilities to plan and formulate for the entrepreneurship.		
Prerequisites:	1	Industrial organizational structure

Course Contents		
Unit No:1	**Project Planning:** Generation and screening of project ideas, Market and Demand Analysis, Technical Analysis, Project Risk Analysis-sensitivity analysis – scenario analysis – Break even Analysis	**6 Hrs.**
Unit No:2	**Financial Estimates and projections:** Project Financing Long Term Financing, Appraisal of Term Loans by Financial Institutions short Term Sources of Finance, other Sources.	**8 Hrs.**
Unit No:3	**Motive for holding Cash:** Objective of cash Management, Factors determine the cash needs, Determiningcash Need	**8 Hrs.**
Unit No:4	**Techniques of Cash Management,** Marketable Securities- Treasury Bills, Commercial papers, Certificates of depositBankers acceptance, Inter-Corporate deposits	**8 Hrs.**
Unit No:5	**Receivables Management:** Objective, Credit policy, Credit Standards &Credit Analysis, Credit terms; CashDiscount; Collection Policies.	**6 Hrs.**
Unit No:6	**Inventory Management:** Objectives; Benefits of holding inventory, Techniques of inventory control EOQ, stock Levels, Role of Central Government and State Government in promoting Entrepreneurship with various incentives, subsidies, grants etc.	**8 Hrs.**

Text Books:	
1	”Projects: Planning, Analysis, Selection, Financing,Implementation, and Review”, Prasanna Chandra (2014), 8th Edition, McGraw Hill Education.
2	“Financial Management”, P.V.Kulkarni & B. G. Satyaprasad (2000), Himalaya Publishing House.

Reference Books:	
1	“Financial Management - Theory, Concepts and Problems”, Dr. R.P.Rustagi (2011), 5th Edition
2	“Financial Management”, I.M.Pandey (2009), 9th Edition, Vikas Publishing House Pvt Limited.

MOOC / NPTEL Courses:	
	1.NPTEL Course **“Project Management for Managers” Link** of the Course: **https://nptel.ac.in/courses/110/107/110107081/** 2.NPTEL Course on **“Intellectual Property Rights and Competition Law”Link** of the Course: **https://nptel.ac.in/courses/110/105/110105139/**

23UGVEC2ET4101T- PROGRAMMING LAB-II (PYTHON)

Lectures : 2 Hrs/Week
Credit : 2

Evaluation Scheme
ISA : 25

Course Objectives: The course aims to :	
1	To develop problem solving skills and their implementation through basic Python.
2	To understand and implement concepts of decision making statements.
3	To implement programs based on looping statements.
4	To understand & implement programs based on built in functions.

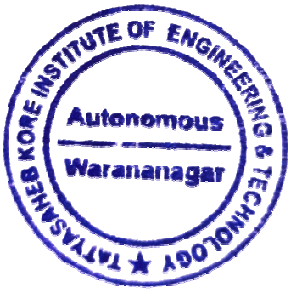
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Identify and use basic concepts of python programming in various data structure.	Remember
CO2	To solve programs on decision making & looping statements in python.	Knowledge, Application
CO3	Understand python list and tuple concepts.	Understand, Apply
CO4	Understand python set and dictionary collection concepts.	Understand, Apply

Description:

Programming Lab-II (Python) course is offered as the basic programming course. This course describes the scope of Python programming in various areas of engineering & research in academics as well as in software industries.

Prerequisites:	1	C Programming
	2	C++ Programming
	3	Data Structure and Algorithm



Course Contents		
Unit No: 1	**Introduction to Python:** Introduction to Python: High level language, Scope of python, interactive mode and script mode. Variables, Operators and Operands in Python. Arithmetic, relational and logical operators, Operator precedence, Taking input using raw input() and input() method and displaying output - print statement, Comments in Python.	**2 Hrs.**
Unit No: 2	**Conditional and Looping:** if - else statement and nested if – else while, for, use of range function in for, Nested loops, break, continue, pass statement Use of compound expression in conditional constructs, Nested conditional statements, Nested Looping structures	**2 Hrs.**
Unit No: 3	**Functions:** Built-In Function, Functions from math, random, time & date module. Composition User Define Function : Defining , invoking functions, passing parameters, Intra-package References, Packages in Multiple Directories	**2 Hrs.**
Unit No: 4	**List:** Lists Concept of mutable lists, creating, initializing and accessing the elements of list, List operations Concatenation, Membership, list slices, List comprehensions List functions & methods: len, insert, append, extend, sort, remove, reverse, pop functions	**2 Hrs.**
Unit No: 5	**Tuples & Sets**: Immutable concept, creating, initializing and accessing the elements in a tuple;Tuple functions: cmp(), len(), max(), min(), tuple(); Sets Concept of Sets , creating, initializing and accessing the elements of Sets operation Membership, union, intersection, difference, and symmetric difference	**2 Hrs.**
Unit No: 6	**Dictionaries:** Dictionaries Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Traversing, appending, updating and deleting elements	**2 Hrs.**

Text Books	
1	"Python: The Complete Reference", Martin C. Brown , Tata McGraw hill 2018.
2	"Learning Python" , Mark Lutz, O' Reilly Publication Edition 2013.
3	"Python Programming for Absolute Beginner", Michael Dawson, Cengage Learning Edition 2010.

Reference Books:	
1	"Python Essential Reference", David Beazley, Developers library 4th Edition.
2	"Head First Python", Paul Barry, O'Reilly Publication Edition 2011.
3	" Let Us Python", Yashavant Kanetkar, BPB Publication, 2009

23UGPCCET401LP- ELECTRONIC DEVICES & CIRCUITS -II LAB

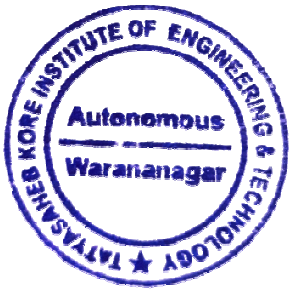
Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 25 Marks

Course Objectives: The course aims to :	
1	Provide an introduction and basic understanding of feedback amplifiers, power amplifiers, oscillators, multivibrators.
2	Develop student ability to apply basic engineering sciences to understand the operation &analysis of electronic circuits using diodes, bipolar junction transistors and field effect transistors
3	Provide analog electronic circuit design techniques using diodes, bipolar junction Transistors and field effect transistors, and to develop analytical skills.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Design Multistage Amplifier	Knowledge, Application
CO2	Analyze Feedback Amplifier	Analysis
CO3	study Power Amplifier	Knowledge
CO4	Describe & Design Different types of Oscillators using BJT	Application
CO5	Describe & Design Different types of Multivibrators using BJT	Knowledge
CO6	Study IC voltage Regulators	Application

Description:		
Electronics Device and Circuit-II course is a core electronics course. This course describes the applications of electronics circuit design. It gives the detail design concept of different electronics circuit for their detail operation and working principle.		
Prerequisites:	1	Electronics Devices and Circuits-I



List of Experiments			
(Minimum 09 experiments + 01 Simulation):			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment as per Bloom's**
1	Design and frequency response of direct coupled amplifier.	2	Knowledge
2	Study the frequency response of two stages RC coupled amplifier.	2	Knowledge
3	Analysis of frequency response of voltage series feedback amplifier.	2	Analysis
4	Design of transformer coupled class A amplifier.	2	Analysis
5	Understand the working principle of RC phase shift oscillator using BJT	2	Knowledge
6	Demonstration of Wein bridge oscillator using BJT	2	Knowledge
7	Analysis of Colpitts oscillator using BJT	2	Knowledge
8	Study of Hartley oscillator using BJT	2	Application
9	Design of Astable multivibrator	2	Application
10	Analysis of monostable multivibrator using BJT	2	Application
11	Design of bistable multivibrator using BJT	2	Application
12	Study of Schmitt trigger using BJT	2	Application
13	Design of voltage regulator using LM317	2	Application
14	Demonstration of voltage regulator using IC723	2	Knowledge
15	Simulation of Oscillator	2	Application
16	Simulation of Multivibrator	2	Application
17	PCB Design a.Design of Astable Multivibrator or Schmitt trigger. b.Design of Power Supply using IC voltage Regulator.	To be Completed in Extra Time	Knowledge Application

23UGPCCET402LP- COMMUNICATION ENGINEERING LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 25 Marks

Course Objectives:	
The objective of the course is to:	
1	Understand the concept of analog communication systems and its types
2	Understand basic concepts of analog modulation and demodulation schemes
3	Study strengths and weakness of various communication systems.
4	Apply knowledge of analog communications systems under the presence of noise

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Understand the concept of analog communication systems and its types.	Understanding Knowledge
CO2	Understand the baseband transmission and reception	Knowledge, Application
CO3	Evaluates problems on analog modulation and demodulation schemes	Knowledge, Application
CO4	Analyze analog communications systems under the presence of noise.	Analyze

Description:		
Course deals with understanding the principles of Analog Communication, study of different types of Pulse modulation techniques, Noise in communication system .It describes the fundamentals of baseband transmission, modulation techniques.		
Prerequisites:	1	Electronic devices & circuits
	2	signals & system
	3	Basics of electronic communication

List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Practical implementation of Amplitude modulation and demodulation	2	Knowledge
2	Calculation of modulation index by graphical method of DSBFC signal & measurement of power of AM wave for different modulating signal.	2	Knowledge
3	SSB modulation using any method (filter method, Phase shift method) and its detection.	2	Knowledge, Application
4	Performance and analysis of AM system using trapezoidal method.	2	Knowledge, Analysis
5	Practical implementation of frequency modulation and demodulation	2	Knowledge
6	Experimenting Sampling and reconstruction and also observe aliasing effect by varying sampling frequency.	2	Analysis
7	Practical implementation of PAM system.	2	Analysis
8	Practical implementation of PWM system	2	Knowledge, Evaluation
9	Practical implementation of PAM-TDM systems	2	Knowledge, Analysis
10	Practical implementation of PPM system	2	Knowledge, Application
11	Envelope detector- Practical diode detector	2	Knowledge, Application
12	Study on Pre-emphasis and De-emphasis.	2	Knowledge
13	Visit to AIR		Knowledge, Application

Note:

1)There should be compulsory one industrial visit related to this subject.

23UGPCCET403LP- LINEAR INTEGRATED CIRCUITS LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 25 Marks

Course Objectives:	
The course aims to :	
1	Understand need of differential amplifier To study the fundamentals /basics of differential amplifier by using transistor.
2	Study internal circuit & operation with different stages of op-amp.
3	Illustrate waveform generators and Timer using special ICs.
4	Study different PLL and VCO ICs and its applications.

Course Outcomes:		
COs	**Upon successful completion of this course, the students will be able to:**	**Blooms Taxonomy**
CO1	Distinguish and design differential amplifiers used in linear integrated circuits.	Analyzing
CO2	Design amplifiers and active filters.	Applying & creating
CO3	Identify and design different linear and non linear application using op-amp	Applying
CO4	Illustrate waveform generators and Timer using special ICs.	Applying
CO5	Describe different PLL and VCO ICs and their applications.	Understanding

Description:

This course deals with the study of basic transistor configuration used as basic building block for integrated circuit called op-amp. It aims t0 establish the firm understanding of linear and non linear application of op-amp. This course also focuses on design aspects of active filters, waveform generators and PLL circuits

Prerequisites:	1	The Basic Concept of circuit theory
	2	Basic Knowledge of electronics devices

List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Basic op-amp configuration -Inverting , Non inverting amplifier	2	Understanding
2	Study the frequency response of operational amplifier	2	Understanding
3	Design and implement differential amplifier and subtractor using op-amp	2	Understanding, Applying
4	Study the summing, scaling, and averaging amplifier	2	Understanding, Applying
5	Build and test precision half & full wave rectifier	2	Applying
6	Build and test Comparator and Schmitt trigger	2	Understanding, Applying
7	Design of Butterworth filters	2	Analyzing
8	Build and test square & triangular wave generator.	2	Understanding, Applying
9	Build and test Integrator and Differentiator	2	Evaluating
10	Design and implement oscillator using Op-Amp.	2	Analyzing
11	Study of multivibrator using IC555	2	Understanding, Applying

23UGVEC2ET4101T- PROGRAMMING LAB-II (PYTHON) LAB

Practical : 2 Hrs/Week **Evaluation Scheme**
Credit : 1 **POE** : NA

Course Objectives:	
The course aims to :	
1	To develop problem solving skills and their implementation through basic Python.
2	To understand and implement concepts of decision making statements.
3	To implement programs based on looping statements.
4	To understand & implement programs based on built in functions.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Identify and use basic concepts of python programming in various data structure.	Remember
CO2	To solve programs on decision making & looping statements in python.	Knowledge, Application
CO3	Understand python list and tuple concepts.	Understand, Apply
CO4	Understand python set and dictionary collection concepts.	Understand, Apply

Description:

Programming Lab-II (Python) course is offered as the basic programming course. This course describes the scope of Python programming in various areas of engineering & research in academics as well as in software industries.

Prerequisites:	1	C Programming
	2	C++ Programming
	3	Data Structure and Algorithm

List of Experiments			
(Minimum 09 experiments + 01 Mini Project compulsory):			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Develop a python program to demonstrate basic data types in python.	2	Knowledge Analysis
2	Develop a python program to study Arithmetic, relational and logical operators and Operands in Python.	2	Knowledge Analysis
3	Develop a python programs to study if, if else , if else if statements.	2	Knowledge Analysis
4	Develop a Write python programs to study looping statements while & for.	2	Knowledge Analysis
5	Develop a Write python programs to study built in functions of string and math packages.	2	Knowledge Analysis
6	Develop a Write python programs to study list access using membership operators.	2	Knowledge , Application
7	Develop a Write python programs to study tuple using inbuilt functions.	2	Knowledge ,Application
8	Develop a Write python programs to study set operations.	2	Knowledge ,Application
9	Develop a Write python programs to study dictionary traversing.	2	Knowledge ,Application

23UGACET411A- AUDIT COURSE-III [ENVIRONMENTAL STUDIES]

Lectures : hrs / week
Credits : Non-Credit

Examination Scheme:
ISE : NA

Course Objectives: The course aims to :	
1	To understand environmental concepts
2	To understand the pollution causes and environment protection methodologies
3	To understand biodiversity and social issues of environment

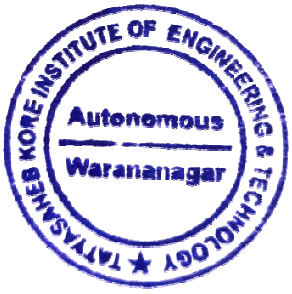
Course Outcomes:		
COs	**Upon successful completion of this course, the students will be able to:**	**Blooms Taxonomy**
CO1	Relate the interdependency of environmental components	Analyzing
CO2	Identify the environmental problems and prevent environmental pollution	Understanding
CO3	Interpret impacts of waste on environmental components	Applying
CO4	Analyze environmental change and its social impacts	Analyzing

Description:

The syllabus of Environmental Studies provides an integrated, quantitative and interdisciplinary approach to the study of environmental systems. The students of Engineering undergoing this course would develop a better understanding of human relationships, perceptions and policies towards the environment and focus on design and technology for improving environmental quality. Their exposure to subjects like understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management and the effects of global climate change, shall help the students to bring a systems approach to the analysis of environmental problems.

Course Contents		
Unit No:1	**Ecology:** Ecosystem, Ecological Pyramids, Food chain, food web, Ecological succession, Natural Resources and Associated Problems. Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources Role of individuals in conservation of natural resources.	**4 Hrs.**
Unit No:2	**Pollution:** Water pollution: causes, effects, control, drinking water quality standards, Arsenic, lead, cadmium, chromium, fluoride contamination & its effects, water treatment, wastewater treatment Air pollution: Causes, effects, control, Air pollution controlling equipments, Air quality standards, National air quality index, vehicular emission, alternative fuels, indoor air pollution, Thermal inversions, Photochemical Smog and Acid Precipitation Noise pollution: Causes, effects, control, noise standards recommended by CPCB, Environmental Protection Act , Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act and International and National efforts for Environmental Protection	**10 Hrs.**
Unit No:3	**Waste management:** Solid waste management, biomedical waste management, E waste, plastic waste management, Hazardous waste management, carbon footprint, Recycling of waste, Role of Central Pollution Control Board (CPCB),State Pollution Control Board, Role of NGO‘s .	**4 Hrs.**
Unit No:4	**Social Issues and Environment:** Global Warming, Ozone layer depletion, urban problems related to energy, Alternative energy sources, Evolution of Sustainable development: timeline, Evolution of green movements in India, Disaster management: Flood, Earthquakes, Cyclones, Landslides, Draught, Tsunami etc., Swachh Bharat Mission, Role of Information technology in Environment and human health.	**6 Hrs.**

Text Books:	
1	“Environmental Biology”, K.C.Agarwal, Nidi publication ltd,Bikaner
2	“A Textbook of Environmental Studies”, D.K.Asthana,Meera Asthana,s.chand publication revised edition,2006
3	“Basic course in environmental Studies”, S,Deswal & A. Deswal, Dhanpat Rai & Co Ltd,Delhi, second revised edition,2009



Reference Books:	
1	"Environmental Science-a study of inter-relationships",Eldon D Enger,Bradley F. Smith,WmC Brown publishers,1989
2	"Ecology of Natural resources", Francois Ramade, John Wiley & Sons,2009
3	"Ecology and Field Biology", Robert Leo Smith, Harper Collins publishers,1998
4	"Introduction to Environmental Engineering & Science", Gilbert M. Masters, Prentice Hall International Inc. Second Edition

Project Work:

Visit to Local Polluted Site- Urban/Rural/Industrial/Agricultural

OR

Study of simple Ecosystems-Ponds ,River, Hill slopes

OR

Preparation of small models or device to resolve the environment problem/issue

Project work shall be based on program

***Evaluation Guideline:**

- This course is non-credit Audit course and at the end of semester, course exam will be conducts as per the guidelines received from Institute. Exam will be of 60 marks for Theory paper and 40 marks for project report and same is to be converted in audit points by the program.
- Each group of Project should consist of maximum 4-5 students
- Project work shall be based on program.
- The project will be evaluated by respective branch HOD and project guide and senior faculty.
- There should be a presentation of project before the committee and a hard copy is to be submitted

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Board of Studies

Academic Dean
T.K.I.E.T. Warananagar

Principal
T.K.I.E.T. Warananagar

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